

CLAIMS

What is claimed is:

1. A water dispersible polymer composition, comprising:
a core polymer including ester linkages formed from secondary or tertiary hydroxy groups; and
a shell polymer.
2. The water dispersible polymer composition of Claim 1, wherein the core polymer comprises at least one epoxy.
3. The water dispersible polymer composition of Claim 2, wherein the at least one epoxy is selected from the group consisting of diglycidyl ethers of Bisphenol A and F or their higher molecular weight homologues, diglycidyl ether of hydrogenated Bisphenol A, and epoxy compounds derived from diol and epichlorohydrin.
4. The water dispersible polymer composition of Claim 1, wherein the core polymer comprises at least one diisocyanate compound.
5. The water dispersible polymer composition of Claim 4, wherein the at least one diisocyanate compound is selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 4,4'-diphenylether diisocyanate, 2,4-tolylene diisocyanate, 2,2,4-trimethylhexamethylene diisocyanate, 3-isocyanatemethyl-3,5,5-trimethylcyclohexyl isocyanate, 1,6-hexamethylene diisocyanate, 1,4-butane diisocyanate, 1,6-hexane diisocyanate, isophorone diisocyanate, 1,3- and 1,4-cyclohexane diisocyanate.
6. The water dispersible polymer composition of Claim 1, wherein the shell polymer comprises at least one acrylic monomer.
7. The water dispersible polymer composition of Claim 6, wherein the at least one acrylic monomer at least one acrylic monomer is selected from the group consisting of styrene, vinyl toluene, methyl methacrylate, hydroxy ethyl acrylate, hydroxy ethyl methacrylate, hydroxy

propyl acrylate, hydroxy propyl methacrylate, isobornyl methacrylate, n-butyl methacrylate, isobutyl methacrylate, n-butyl acrylate, and 2-ethyl hexyl (meth)acrylate.

8. A method of forming a water dispersible polymer composition, comprising mixing a core polymer having at least five molar percent of ester linkages formed from secondary or tertiary hydroxy groups with a shell polymer formed by radical polymerization of at least one ethylenically unsaturated monomer and (meth)acrylic acid in the presence of at least one unsaturated fatty acid.

9. The method of Claim 8, wherein said shell polymer is formed by radical polymerization of at least one ethylenically unsaturated monomer and (meth)acrylic acid in the presence of at least one unsaturated fatty acid.

10. The method of Claim 8, further comprising bonding the core polymer and the shell polymer by condensation reaction.

11. The method of Claim 8, further comprising bonding the core polymer and the shell polymer by condensation reaction between a carboxy group in a fatty acid and a hydroxy group in the core polymer.

12. The method of Claim 8, further comprising heating the mixture of the core polymer and the shell polymer to a temperature between about 180 °C and about 220 °C.

13. The method of Claim 8, further comprising reacting the core polymer with trimellitic anhydride.

14. The method of Claim 8, further comprising heat aging the mixture.

15. The method of Claim 14, wherein the heat aging comprises heating the mixture to about 65 °C or above.

16. The method of Claim 14, wherein the heat aging comprises heating the mixture to about 65 °C or above for a period of at least 2 hours.

17. A core/shell polymer composition with ester linkages, comprising a core/shell polymer composition wherein at least 5 molar percent of the ester linkages are secondary or tertiary ester linkages.

18. The core/shell polymer composition of Claim 17, wherein the core/shell polymer is a core/shell alkyd.

19. The core/shell polymer composition of Claim 17, wherein the core/shell polymer is a core/shell polyester.

20. The core/shell polymer composition of Claim 17, further comprising at least one pigment.

21. A water dispersible polymer composition, comprising:
a core/shell polymer composition with ester linkages wherein at least 5 molar percent of the ester linkages are secondary or tertiary ester linkages; and
at least one pigment.

22. A method of improving the viscosity characteristics of a core/shell alkyd dispersion, comprising heat aging a core/shell alkyd dispersion.

23. The method of claim 22, wherein heat aging a core/shell alkyd dispersion comprises:

heating said core/shell alkyd dispersion to a temperature at or above about 65 °C in an ambient atmosphere; and
maintaining said heating for a period of at least about 2 hours.

24. The method of claim 23, further comprising agitating said core/shell alkyd dispersion during said heating.

25. The method of claim 23, wherein heating said core/shell alkyd dispersion comprises heating said core/shell alkyd dispersion to a temperature at or between about 65 °C to about 98 °C.

26. The method of claim 23, wherein maintaining said heating for a period of at least about 2 hours comprises maintaining said heating for a period of between about 2 hours to about 72 hours.

27. The method of claim 22, wherein heat aging a core/shell alkyd dispersion comprises:

heating said core/shell alkyd dispersion in a reactor to a temperature of about 100 °C or greater with a pressure greater than atmospheric pressure; and
maintaining said heating for a period of about 2 to about 72 hours.

28. The method of claim 27, further comprising agitating said core/shell alkyd dispersion during said heating.

29. A core/shell alkyd dispersion having improved viscosity characteristics, comprising a heat aged core/shell alkyd dispersion.

30. The core/shell alkyd dispersion of claim 28, wherein at least a portion of the core of the core/shell alkyd dispersion is reacted with trimellitic anhydride.

31. A method of improving the viscosity characteristics of a core/shell alkyd dispersion, comprising reacting the core/shell alkyd dispersion with trimellitic anhydride.

32. A water dispersible polymer composition, comprising:
a core polymer;

a shell polymer; and
trimellitic anhydride.

33. The water dispersible polymer composition of Claim 32, wherein the core polymer is formed from at least one compound selected from the group consisting of hydroxy-containing polyols, polyacids, oils, fatty acids, mono-functional acids, and mono-functional alcohols.

34. The water dispersible polymer composition of Claim 32, wherein the shell polymer is formed by radical polymerization of at least one acrylic monomer and (meth)acrylic acid in the presence of unsaturated fatty acids.

35. The water dispersible polymer composition of Claim 32, wherein the core polymer comprises between about 5 and about 95 weight percent of the water dispersible polymer composition.

36. The water dispersible polymer composition of Claim 32, wherein the shell polymer comprises between about 5 and about 95 weight percent of the water dispersible polymer composition.

37. The water dispersible polymer composition of Claim 32, wherein the trimellitic anhydride comprises up to about 25 weight percent of the water dispersible polymer composition.

38. A paint composition, comprising:
a pigment;
a core polymer;
a shell polymer; and
trimellitic anhydride.

39. An ink, comprising:

a core polymer;
a shell polymer; and
trimellitic anhydride.

40. An adhesive, comprising:

a core polymer;
a shell polymer; and
trimellitic anhydride.

41. A water dispersible polymer composition, comprising:

a core polymer including ester linkages formed from secondary or tertiary hydroxy groups; and
a shell polymer formed by radical polymerization of at least one acrylic monomer and
(meth)acrylic acid in the presence of unsaturated fatty acids.

42. The water dispersible polymer composition of Claim 41, wherein said shell polymer comprises at least 5 weight percent of the water dispersible polymer composition.

43. The water dispersible polymer composition of Claim 41, further comprising at least one additive selected from the group consisting of thinners, neutralizers, pigments, and water.

44. The water dispersible polymer composition of Claim 41, wherein said shell polymer comprises at most 95 weight percent of the unsaturated fatty acids.

45. The water dispersible polymer composition of Claim 41, wherein said core polymer comprises between about 5 and about 95 weight percent of the water dispersible polymer composition.

46. The water dispersible polymer composition of Claim 41, further comprising at least one organic solvent in an amount between about 5 and about 30 weight percent of the water dispersible polymer composition.

47. The water dispersible polymer composition of Claim 41, further comprising trimellitic anhydride.

48. The water dispersible polymer composition of Claim 41, wherein said at least one acrylic monomer is selected from the group consisting of styrene, vinyl toluene, methyl methacrylate, hydroxy ethyl acrylate, hydroxy ethyl methacrylate, hydroxy propyl acrylate, hydroxy propyl methacrylate, isobornyl methacrylate, n-butyl methacrylate, isobutyl methacrylate, n-butyl acrylate, and 2-ethyl hexyl (meth)acrylate.

49. The water dispersible polymer composition of Claim 41, wherein the core polymer comprises at least one epoxy compound.

50. The water dispersible polymer composition of Claim 49, wherein the at least one epoxy compound is selected from the group consisting of diglycidyl ethers of Bisphenol A and F or their higher molecular weight homologues, diglycidyl ether of hydrogenated Bisphenol A, and epoxy compounds derived from diol and epichlorohydrin.

51. The water dispersible polymer composition of Claim 41, wherein the core polymer comprises at least one diisocyanate compound.

52. The water dispersible polymer composition of Claim 51, wherein the at least one diisocyanate compound is selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 4,4'-diphenylether diisocyanate, 2,4-tolylene diisocyanate, 2,2,4-trimethylhexamethylene diisocyanate, 3-isocyanatemethyl-3,5,5-trimethylcyclohexyl isocyanate, 1,6-hexamethylene diisocyanate, 1,4-butane diisocyanate, 1,6-hexane diisocyanate, isophorone diisocyanate, 1,3- and 1,4-cyclohexane diisocyanate.

53. A coating composition, comprising:
a core polymer including ester linkages formed from secondary or tertiary hydroxy groups; and

a shell polymer formed by radical polymerization of at least one acrylic monomer and (meth)acrylic acid in the presence of unsaturated fatty acids.

54. The coating composition of Claim 53, wherein the core polymer is an alkyd polymer.

55. The coating composition of Claim 53, wherein the core polymer is a polyester.

56. The coating composition of Claim 53, further comprising at least one pigment.

57. The coating composition of Claim 53, further comprising at least one melamine crosslinker.

58. The coating composition of Claim 53, further comprising at least one multi-functional isocyanate crosslinker.

59. The coating composition of Claim 53, wherein the core polymer and the shell polymer are bonded by a condensation reaction.

60. The coating composition of Claim 53, wherein said at least one acrylic monomer is selected from the group consisting of styrene, vinyl toluene, methyl methacrylate, hydroxy ethyl acrylate, hydroxy ethyl methacrylate, hydroxy propyl acrylate, hydroxy propyl methacrylate, isobornyl methacrylate, n-butyl methacrylate, isobutyl methacrylate, n-butyl acrylate, and 2-ethyl hexyl (meth)acrylate.

61. The water dispersible polymer composition of Claim 53, wherein the core polymer comprises at least one epoxy compound.

62. The water dispersible polymer composition of Claim 61, wherein the at least one epoxy compound is selected from the group consisting of diglycidyl ethers of Bisphenol A and F

or their higher molecular weight homologues, diglycidyl ether of hydrogenated Bisphenol A, and epoxy compounds derived from diol and epichlorohydrin.

63. The water dispersible polymer composition of Claim 53, wherein the core polymer comprises at least one diisocyanate compound.

64. The water dispersible polymer composition of Claim 63, wherein the at least one diisocyanate compound is selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 4,4'-diphenylether diisocyanate, 2,4-tolylene diisocyanate, 2,2,4-trimethylhexamethylene diisocyanate, 3-isocyanatemethyl-3,5,5-trimethylcyclohexyl isocyanate, 1,6-hexamethylene diisocyanate, 1,4-butane diisocyanate, 1,6-hexane diisocyanate, isophorone diisocyanate, 1,3- and 1,4-cyclohexane diisocyanate.

65. An ink composition, comprising:
a core polymer including ester linkages formed from secondary or tertiary hydroxy groups; and
a shell polymer formed by radical polymerization of at least one acrylic monomer and
(meth)acrylic acid in the presence of unsaturated fatty acids.

66. An adhesive composition, comprising:
a core polymer including ester linkages formed from secondary or tertiary hydroxy groups; and
a shell polymer formed by radical polymerization of at least one acrylic monomer and
(meth)acrylic acid in the presence of unsaturated fatty acids.

67. A water-dispersible polymer composition comprising a core polymer formed from hydrophobic and bulky alkyl substituted primary polyols; and
a shell polymer.

68. The water-dispersible polymer composition of Claim 96, wherein the hydrophobic and bulky alkyl substituted primary polyols are selected from the group consisting of cyclohexyl dimethanol and 2-butyl-2-ethyl-1,3-propanediol.

69. A water-dispersible polymer composition comprising a core polymer formed from poly (styrene-allyl alcohol) and at least one fatty acid; and a shell polymer.

70. A water-dispersible polymer composition comprising a core polymer and a shell polymer, wherein the core polymer comprises a dendritic and hyper-branched polyester.